REMARKS

Applicant is proposing a minor modification to page 3, line 8, of the specification to correct a mistranslation of the French word "enclenche." As originally filed, that word was translated to the English word "locked," when it should have been translated to the English word "started."

Turning now to the claims, claims 7, 11 and 12 have been amended, as set forth above, to correct translation errors and to align the claims with the words used in the specification.

Claims 7, 9, 11 and 12 stand rejected under 35 USC 103(a) as being unpatentable over Lau et al (U.S. Patent Numbers 5,372,013 and 5,937,660) in view of Bawel U.S. Patent Number 3,750,419), and vice versa.

The Applicant respectfully traverses this ground of rejection for the following reasons.

Lau '013 and '660 disclose a system for the production of cold in a compressive mode, comprising a generator (compressor 201), a condenser (202), an evaporator (204), an expansion valve (203) (but no absorber), and a storing assembly of cooling liquid under pressure, namely the refrigerant reservoir (205). This reservoir has an upstream valve (206) and a downstream valve (207).

Lau's system also has a reservoir by-pass valve (108) between the condenser (202) and the expansion valve (203).

In operation, Lau's compressor (201) is running and the valves (206) and (207) are open. See col. 2, lines 50-68. When the compressor (201) is turned off, the valves (206) and (207) are closed and by-pass valve 108 open. Thus, when the compressor (201)

is switched on again, the valves (206) and (209) are opened and the liquid refrigerant stored in reservoir (205) flows through the expansion valve (203) to the evaporator (204) to provide rapid cooling. The liquid refrigerant is stored in the reservoir, while the compressor (201) is switched on, before the simultaneous closure of the valves (206) and (207).

Bauwel '419 relates to an absorption refrigerating machine, and also provides a by-pass arrangement, namely by-pass valve 24 (see also claim 2). Bauwel's system does not have a corresponding reservoir for the liquid refrigerant for providing an "instant cooling effect on start-up."

The Applicant's claimed invention relates to a system for the production of cold by absorption, comprising, as set out in the preamble of claim 7, a generator (1), a condenser (2), an evaporator (7), an expansion valve (6), an absorber (8), and a storing assembly of cooling liquid under pressure, namely the receiver (or reservoir) (4), a valve (3) upstream of the receiver (4) and a valve (5) downstream of the receiver/reservoir. This preamble of claim 7 corresponds to the teaching of Lau, except for an absorption system instead of Lau's compressive system.

As set out in amended claim 7, the present invention solves the problem of providing for the production of cold on start up by arranging that the upstream valve (3) is passing when the pressure upstream is greater than or equal to the pressure downstream, and in that, in response to interrupting operation of the system to produce cold, the downstream valve (5) is blocked when or before the generator (1) stops producing vapor.

The system of the present invention is typically installed in an automobile in which the heat from the engine is used to heat the refrigerant liquid, for example by using heat from the automobile's exhaust system. When the engine is stopped, the engine and its exhaust system remain hot for some time, so that during stoppage of the engine the residual heat can be used to heat the refrigerating liquid. In the system of the present invention, as long as the pressure in the liquid upstream of the reservoir is greater than the pressure in the receiver/reservoir (4), the liquid continues to be stored in the receiver/reservoir. When operation of the cooling system is interrupted (as when the engine is switched off), the pressure drops because the generator (1) stops producing vapor, and the downstream valve (5) closes when or before the generator stops producing vapour, so liquid can continue to be stored in and remains stored in the receiver/reservoir (4).

When the cooling system is started again, the downstream valve (5) opens immediately, releasing the refrigerating liquid in the receiver/reservoir (4) to the evaporator (7) to immediately begin the cooling effect. However, the upsteam valve (3) remains closed until the pressure upstream is greater than or equal to the pressure downstream. Then, when the pressure upstream is greater than or equal to the pressure downstream, the upstream valve (3) opens, allowing the condensed refrigerating fluid to pass via the open downstream valve (5) to the evaporator (7), and also to fill the receiver (4). Filling of the receiver (4) will be completed when the system is switched off, as explained above.

The result is that the energy (heat) dissipated for example by an automobile's hot engine/exhaust system when the engine is not running is used to store refrigerating liquid

that is released to provide a cooling effect when the engine is started again. Thus, the present invention applies to an absorption system (be it NH4 + H2O, or H2O + LiBr) that builds up a store of refrigerant liquid as long as the system releases energy/heat.

This is entirely different from Lau's arrangement. Lau provides upstream and downstream valves (206, 207) that are simultaneously open during operation and closed during stoppage (see col. 2, lines 50-68), in combination with a by-pass valve (108). In Lau's arrangement, when the compressor is switched off, the valves (206, 207) are closed and liquid refrigerant already in the reservoir (205) stays trapped in the reservoir (col. 2, lines 60-63). Lau's system does not provide for continued filling of the reservoir when the compressor (201) stops running, whereby the upstream valve (206) passes when the pressure upstream is greater than or equal to the pressure downstream. In Lau's system the upstream and downstream valves (206, 207) are both blocked when the compressor (201) stops.

Neither Lau nor Bawel provides any guidance towards the now-claimed solution wherein the upstream valve (3) passes when the pressure upstream is greater than or equal to the pressure downstream, and the downstream valve (5) is blocked in response to interruption of the operation of the system to produce cooling, when or before the generator (1) stops producing vapor. In the Applicant's invention as claimed, the upstream and downstream valves act independently of one another as a function of the pressure conditions in the system and provide for continued filling of the receiver/reservoir as long as the pressure in the liquid upstream of the reservoir (produced while the generator (1) produces vapor) is greater than the pressure in the receiver/reservoir (4). This occurs even after operation of the system to produce cooling

is interrupted. In contrast, in Lau the upstream and downstream valves are both simultaneously on or both simultaneously off.

The system of the present invention with independently-operated upstream and downstream valves has the advantage that during operation of the system, and when the operation of the system to produce cooling is interrupted, the receiver/reservoir accumulates the maximum amount of refrigerant, typically in an automobile vehicle using the heat of a stopped automobile engine, after the engine has been switched off. The refrigerant used for providing an immediate cooling effect on start-up can be stored using the energy/heat dissipated by an automobile's hot engine as it cools. The invention can therefore make use of "wasted" energy to store refrigerant. The invention can be implemented with a simple one-way valve, namely the upstream valve (3) that remains open as long as the pressure upstream is greater than the pressure downstream, or by means of a pressure-controlled valve fulfilling the same function.

The above-outlined advantages of the claimed invention are not foreshadowed by Lau or by Bowel, and cannot be procured by following the teachings of these documents.

From the above, it can be seen that a combination of the teachings of Lau and Bawel would not lead in any obvious way to the claimed invention. Any combination of Lau and Bawel would at most lead to an absorption system with a by-pass valve arrangement as in Lau, and as also in Bawel. It is therefore submitted that the invention of claim 7 is not obvious over Lau or by Bowel, and cannot be reached by any obvious combination of these documents.

It is noted that claim 8 was rejected as being dependent from a rejected base claim, but was considered allowable if re-written in independent form. The Applicant

submits that as claim 7 is allowable for the reasons above, claim 8 which depends thereon should also be deemed allowable. The Applicant moreover wishes to comment that providing the receiver/reservoir (4) with a security valve (9) fulfills an important security function and is advantageous as such valve can be calibrated according to the characteristics of different coolant liquids. The provision of such security valve avoids problems, in particular in the case of an accident. However, the security valve, though it is advantageous in implementing the operation of the system defined in claim 7, is not regarded as an essential element of claim 7's system.

With regard to claim 9, this claim depends on claim 7, which is allowable for the reasons given above.

Claim 10 stands rejected under 35 USC 103(a) as being unpatentable over Lau et al and Bawel as applied above, and further in view of Zimmern (U.S. Patent 4,509,341) or Giacometti et al (U.S. Patent number 5,351,504). Zimmern and Giacometti show electrovalves but do not contain any teaching that would guide the skilled person to the system of claim 7, which the Applicant maintains is allowable for the reasons given above. It is therefore submitted that the invention of claim 10 is not obvious over Lau or by Bowel, neither can it be reached by any obvious combination of these documents together with Zimmern and/or Giacometti.

The method of producing cold as claimed in claim 11 sets out, in method steps, an operating counterpart to the system claim 7. According to the characterizing portion of amended claim 11, a downstream valve (5) is opened when the production of cold is desired. When this downstream valve (5) is opened it releases the liquid stored under pressure in the receiver, to the evaporator (7) to produce cold. An upstream valve (3) is

opened only when the pressure at the exit of the condenser (2) is higher than the pressure inside the receiver/reservoir (4), and the downstream valve (5) is closed, in response to interrupting operation of the system to produce cold, when or before the boiler no longer produces vapour. This operating sequence involves the advantages discussed above for the system claim 7.

Moreover, this operating sequence is not disclosed in Lau, and cannot be derived from Lau, or a combination of Lau and Bawel, for the reasons set out above for the system of claim 7.

With regard to claim 12, this claim depends on claim 11 which is allowable for the reasons given above. Furthermore claim 12, as amended, specifies that the downstream valve (5) is closed a little time before the stopping of vapour production to produce pressurized cooling liquid that is accumulated in the receiver (4). This correction to the claim removes an unclarity and specifies a sequence nowhere disclosed in Lau ('660).

For all these foregoing reasons, Applicant respectfully requests entry of the foregoing amendments to the specification and to the claims, reconsideration of the present application in light thereof, and in light of the remarks set forth above, and then allowance of all claims 7-12, now pending, as amended, over all the prior art of record.

Respectfully submitted:

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